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**Chemical Strategies for Stem Cell Biology and Regenerative Medicine.**

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**Funding Grants:** Derivation of New ICM-stage hESCs, Reprogramming of human somatic cells back to pluripotent embryonic stem cells

**Public Summary:**

Stem cell technology holds great promises for the cures of devastating diseases, injuries, aging, and even cancers as it is applied in regenerative medicine. Recent breakthroughs in the development of induced pluripotent stem cell techniques and efficient differentiation strategies have generated tremendous enthusiasm and efforts to explore the therapeutic potential of stem cells. Small molecules, which target specific signaling pathways and/or proteins, have been demonstrated to be particularly valuable for manipulating cell fate, state, and function. Such small molecules not only are useful in generating desired cell types in vitro for various applications but also could be further developed as conventional therapeutics to stimulate patients' endogenous cells to repair and regenerate in vivo. Here, we focus on recent progress in the use of small molecules in stem cell biology and regenerative medicine. Expected final online publication date for the Annual Review of Biomedical Engineering Volume 13 is July 15, 2011. Please see <http://www.annualreviews.org/catalog/pubdates.aspx> for revised estimates.

**Scientific Abstract:**

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